

REMARKS

1. Rejection Under §102(b)

A. Claims 1, 9-12, 14, 15, 19-22, 28, and 35-38

Claims 1, 9-12, 14, 15, 19-22, 28, and 35-38 stand rejected under 35 U.S.C. §102(b) as being unpatentable over Holmes, U.S. Patent No. 5,484,107 ("Holmes"). (Paper No. 20110628 at 4-6). For the reasons set forth below, this rejection is respectfully traversed.

Holmes discloses a three-fluid atomizer for, e.g., introducing mixtures into a chemical reactor or a boiler. (See, e.g., Holmes, Abstract and Col. 1, Ins. 22-24). Holmes discloses that its apparatus allows for a pre-mixing of two fluids before entering the mixing chamber followed by an additional mixing step with the third fluid in the mixing chamber further followed by atomization as the mixture passes through the holes in the nozzle head of the atomizer. The mixture of the three fluids exits the nozzle head holes at very high velocities (near sonic) and forms turbulent jets which cause the mixture to break up into fine droplets. (See, e.g., Col. 1, In. 67 – Col. 2., In. 13).

In making the rejection, the Examiner asserts that:

Holmes shows an apparatus (Fig. 1) for generating a mist comprising: a conduit (10) having a mixing chamber (24/32) and an exit (34); and a means for creating a dispersed droplet flow regime in which a substantial portion of the droplets have a size of less than 20 micrometers (the apparatus of Holmes as shown teaches all of the structural attributes claimed and is therefore capable of operating in the same manner as the claimed invention), said means comprising a working fluid inlet (20) in fluid communication with said conduit to introduce a

working fluid into the conduit; and a transport nozzle (28) in fluid communication with the conduit to introduce a transport fluid into the mixing chamber; wherein the nozzle includes a convergent-divergent portion therein to provide for the generation of high velocity flow of the transport fluid; and wherein the transport nozzle (28) and conduit (24/32) have a relative angular orientation at the mixing chamber by [sic] for the introduction of transport fluid flow from the transport nozzle into working fluid flow from the conduit and for shearing of the working fluid by the transport fluid.

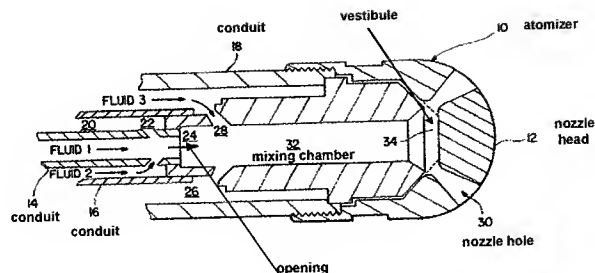
(Paper No. 20110628 at 4-5).

As is well settled, anticipation requires "identity of invention." *Glaverbel Societe Anonyme v. Northlake Mktg. & Supply*, 33 USPQ2d 1496, 1498 (Fed. Cir. 1995). Each and every element recited in a claim must be found in a single prior art reference and arranged as in the claim. *In re Marshall*, 198 USPQ 344, 346 (CCPA 1978); *Lindemann Maschinenfabrik GMBH v. American Hoist and Derrick Co.*, 221 USPQ 481, 485 (Fed. Cir 1984).

Initially, we note that the rejection misinterprets Holmes in a number of ways and thus fails to identify each and every element recited in the claims. For example, the rejection asserts that Figure 1 of Holmes shows an apparatus comprising "a conduit (10) having a mixing chamber (24/32) and an exit (34)." (Paper No. 20110628 at 4). An inspection of Figure 1 reveals that 10 corresponds to the atomizer portion of the apparatus, which includes a hollow nozzle head (12), a vestibule (34), and nozzle holes (30). The rejection also asserts that reference number 24 designates either a mixing chamber (see p. 4) or a conduit (see, p. 5). An inspection of Figure 1 reveals that reference number

24 simply identifies an "opening" to mixing chamber 32. (See, Holmes, Col. 3, In. 27-28). The rejection further asserts that reference number 34 identifies "an exit." An inspection of Figure 1 reveals that reference number 34 designates "a vestibule" into which the fluid mixture passes after the mixing chamber. The mixture then exits the apparatus through the holes in the nozzle head. (See, e.g., Holmes, Col. 2, Ins. 10-13; Col. 3, Ins. 15-19; and Figure 1).

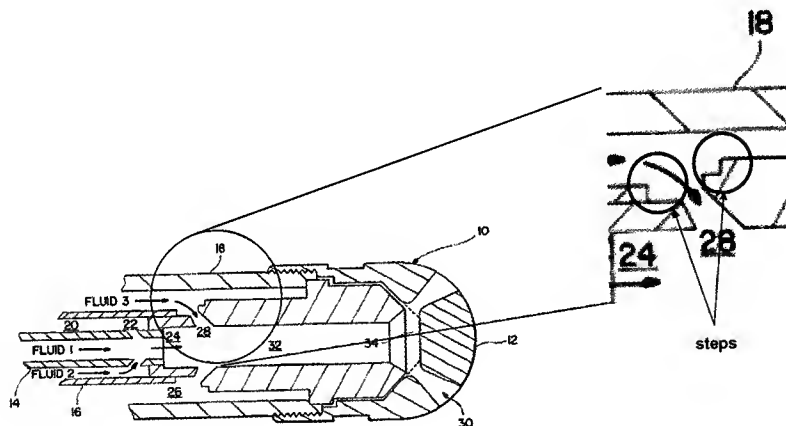
We also note that the rejection uses the same reference numbers for multiple structurally distinct components of the Holmes apparatus. For example, on p. 4 of the Office Action, a "mixing chamber" is designated as "(24/32)," whereas on p. 5 of the Office Action, a "conduit" is designated as "(24/32)." The conduits and mixing chamber identified in Holmes are clearly distinct structural elements and are not interchangeable as the rejection seems to indicate. At bottom, reference numbers 24 and 32 are not both "mixing chambers", nor are they both "conduits." Indeed, reference number 24 is neither a "mixing chamber" nor a "conduit." Rather, reference number 24 is an "opening", reference numbers 14, 16, and 18 are "fluid supply conduits", and reference number 32 is a "mixing chamber." These distinctions are readily seen in Holmes, Fig. 1 below:



When an Examiner makes a mistake of fact in a rejection, such as, e.g., those set forth above, the rejection cannot stand. See, e.g., *Ex parte Chane*, 2011 WL 4975870, *3-4 (B.P.A.I. October 14, 2011) (reversing an examiner's anticipation rejection because of factual errors). In view of the misinterpretations and mistakes identified above, the rejection of claims 1, 9-12, 14, 15, 19-22, 28, and 35-38 must be withdrawn.

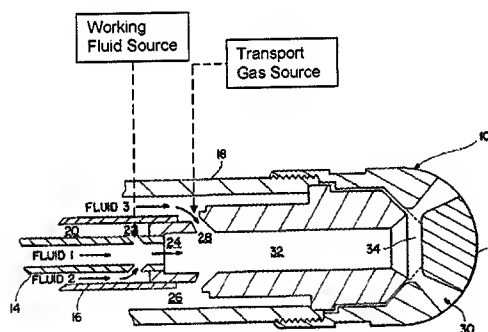
We further note that the rejection baldly asserts that reference number 28 is a "transport nozzle [that] includes a convergent-divergent portion...." (Paper No. 20110628 at 4-5). Holmes, however, simply identifies reference number 28 as "an opening" from passage 26 to mixing chamber 32. (Col. 3, ln. 33). The rejection does not – and cannot – identify where in Holmes the opening is defined as a "nozzle", let alone a nozzle that "includes a convergent-divergent portion" as recited in claim 1. Indeed, an inspection of

Holmes demonstrates that the only nozzles identified are those formed from the holes (30) in the nozzle head (12). Thus, we can only infer that the rejection mistakenly reads in "nozzle" and "convergent-divergent" limitations where none was described or shown in Holmes. Indeed, one skilled in the art would expect a convergent-divergent nozzle to have a smooth-walled inlet, with a gradual decrease in cross-sectional area – just as shown in, e.g., Figure 9 of the present application. By contrast, the opening 28 of Holmes, Figure 1 (see below) clearly has steps and there is no disclosure of any divergent portion of the alleged nozzle, nor is there any indication of what the included angle of the postulated divergent portion might be.

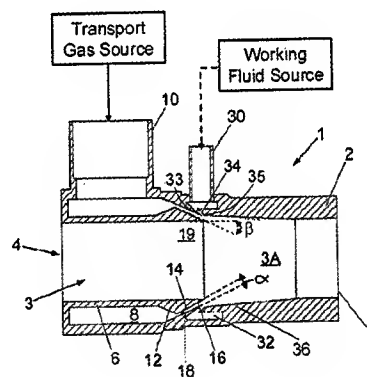


In addition, Holmes, Figure 1 clearly shows that Fluid 3 (i.e., the expandable gas, such as steam) enters the mixing chamber 32 last through opening 28 with a mixture of Fluid 1 and Fluid 2 entering the mixing chamber

through opening 24, which is upstream of opening 28. ("The first fluid supply conduit has an aperture through the conduit wall so that the first and second fluids combine before being further mixed and dispersed by the third fluid." (Abstract) (emphasis added). Thus, the Fluid 2 (i.e., the working fluid) of Holmes enters the mixing chamber before Fluid 3 (i.e., the transport fluid). Claim 1 of the present invention, however, recites that the working fluid enters the mixing chamber after the transport fluid ("...for the introduction of transport fluid flow into working fluid flow from the conduit..."). This clear structural difference is easily seen by reference to Figure 9 of the present invention and Figure 1 of Holmes:



Holmes, Fig. 1



Application, Fig. 9

The rejection asserts, without support that "Holmes as shown teaches all of the structural attributes claimed...." (Paper No. 20110628 at 4). As demonstrated above, this assertion cannot stand. Indeed, the Examiner concedes as much on p. 8 of the Office Action ("Holmes does not teach in which

a substantial portion of the droplets have a size less than 20 micrometers.”). Thus, the rejection’s conclusion that Holmes discloses each and every element of the means for creating a dispersed droplet flow regime in which a substantial portion of the droplets have a size of less than 20 micrometers as recited, e.g., in claim 1 is not supported by facts and cannot stand for this additional reason.

In view of the clear structural differences identified above between, e.g., claim 1 of the present invention and Holmes, the rejection cannot stand and should be withdrawn.

Thus, for at least the reasons identified above, the rejection of claims 1, 9-12, 14, 15, 19-22, and 28 must be withdrawn.

Claim 35 recites a spray system “comprising the apparatus of claim 1” Because the recited spray system of claim 35 includes the apparatus of claim 1, the rejection of claim 35 (and claims 36-38, which depend on claim 35) is also untenable and must be withdrawn for the same reasons presented above with respect to claim 1 (and dependent claims 9-12, 14, 15, 19-22, and 28).

For all of the foregoing reasons, the rejection should be withdrawn.

2. Rejections Under §103(a)

A. Claims 3, 5, and 8

Claims 3, 5, and 8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Holmes. (Paper No. 20110628 at 6-8). For the reasons set forth below, the rejection is respectfully traversed.

Holmes is summarized above.

In making the rejection with respect to claim 3, the Examiner asserted that Holmes "shows a cumulative distribution of the droplets but does not teach that the distribution is greater than 90%." (Id. at 6). To fill this acknowledged gap, the Examiner asserted that "it would have been obvious to one having ordinary skill in the art at the time the invention was made to have a distribution greater than 90%, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art." (Id. at 6-7).

In making the rejection with respect to claim 5, the Examiner asserted that "Holmes shows an annular working nozzle (Fig. 1, 22) and the transport nozzle (28), but does not teach that the working nozzle circumscribes the transport nozzle. (Id. at 7). To fill this acknowledged gap, the Examiner asserted that "[i]t would have been obvious to one of ordinary skill in the art to reverse the working and transport nozzles of Holmes to affect the spray pattern." (Id.).

In making the rejection with respect to claim 8, the Examiner asserted that "Holmes shows the transport nozzle (Fig. 1, 28) has an exit area to throat ratio and an alpha angle." (Id.). The Examiner acknowledged, however, that "Holmes does not teach the ratio being in the range 1.75 to 15 or the alpha angle substantially equal to or less than 6 degrees." (Id.). To fill this acknowledged gap, the Examiner asserted that "[i]t would have been obvious to one of ordinary skill in the art to have an exit area to throat ratio of 1.75 to 15 and

the alpha angle substantially equal to or less than 6 degrees to affect spray pattern. (Id.).

It is well settled that the Examiner bears the burden to set forth a *prima facie* case of unpatentability. *In re Glaug*, 62 USPQ2d 1151, 1152 (Fed. Cir. 2002); *In re Oetiker*, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); and *In re Piasecki*, 223 USPQ 785, 788 (Fed. Cir. 1984). If the PTO fails to meet its burden, then the applicant is entitled to a patent. *Glaug*, 62 USPQ2d at 1152.

A *prima facie* case of obviousness must be based on facts, "cold hard facts." *In re Freed*, 165 USPQ 570, 571-72 (C.C.P.A. 1970). When the rejection is not supported by facts, it cannot stand. *Ex parte Saceman*, 27 USPQ2d 1472, 1474 (B.P.A.I. 1993).

Our comments in Section 1A, *supra*, are incorporated herein by reference. The factual gaps noted in Section 1A with respect to Holmes and claim 1 are equally applicable in the instant rejection. And, nothing in the rejection of claims 3, 5, and 8 remedies the previously identified gaps. Thus, for at least the reasons noted in Section 1A, *supra*, which stand unrebutted, the rejection of claims 3, 5, and 8 should be withdrawn.

In addition, the only so-called evidenced used to support the reasoning underlying the rejection of claim 5 is the Examiner's bald assertion that "a mere reversal of the essential working parts of a device involves only routine skill in the art." (Paper No. 20110628 at 7). The rejection, however, fails to come to grips with the fact that the apparatus recited in, e.g., claim 5 is designed to

carry out the atomization in a particular way – one that is distinct from the atomization carried out by the Holmes apparatus.

As one skilled in this art recognizes, the orientation of the two nozzles in claim 5 is designed so that the respective working and transport fluids meet each other as thin sheets, which impinge on each other and start the atomization process. There is simply no disclosure or suggestion in Holmes of this effect. In fact, Holmes teaches away from atomization at this point, as the nozzle head (12) and holes (30) are required in Holmes for the actual atomization.

The mixture of the three fluids exits the nozzle head holes at very high velocities (near sonic) and forms turbulent jets which cause the mixture to break up into fine droplets.

(Col. 2, Ins. 10-13).

The third fluid is generally expandable to help mix and disperse the first and second fluids and to help discharge a jet of finely atomized fluid mixture through one or more nozzle holes (30) extending in the nozzle head (12).

(Col. 3, Ins. 15-19).

Thus, motivation to move the so-called aperture (22) in Holmes is not simply a matter of “moving of essential parts” as the rejection suggests, but requires an understanding that to do so would create an entirely different mechanism. The rejection provides no evidence or suggestion for the motivation to make the proposed structural modifications, let alone any evidence that such modification would work.

In particular, the Holmes apparatus mixes Fluids 1 and 2, aided by Fluid 3, and then atomizes the mixture of the three fluids at a later, downstream, stage. Whereas, the apparatus recited in claim 5 uses a gas (Fluid 3) to atomize a liquid (Fluid 2) with an inlet fluid (Fluid 1), also likely to be gaseous, aspirated into the mixture. The movement of parts as proposed in the rejection would require one skilled in the art to conclude that the pre-mixing of Fluids 1 and 2 and the further mixing driven by Fluid 3 disclosed in Holmes is unnecessary. The proposed rearrangement, however, flies in the face of a stated objective of Holmes, namely to improve upon dual fluid atomization:

Dual fluid atomization is a method which uses the momentum supplied by a compressible fluid (usually air or steam) to break up a second fluid (usually a liquid) into very fine droplets. ***In many applications it is necessary to mix a third fluid into the atomized liquid and surrounding fluid (usually a gas). For the case described here, this is done by internally mixing the liquid, the compressible fluid, and the third fluid, and spraying the mixture into the surroundings through small orifices in the nozzle of the atomizer.*** The momentum of the atomizer jets will provide rapid mixing of these three fluids and the surrounding gas in addition to breaking up the liquids. Such a technique may be applied to beneficially introduce mixtures into a chemical reactor or a boiler.

(Col. 1, Ins. 10-24) (emphasis added).

Thus, to modify Holmes as proposed to make it a dual fluid atomization apparatus/method in the face of prior art cited in Holmes, which strongly suggests that such a method would produce unacceptable results is, in fact, the very antithesis of obviousness. And, for this reason also the rejection of

claim 5 should be withdrawn. See, e.g., *In re Rosenberg*, 386 F.2d 1015, 1018, 156 USPQ 24, 26 (C.C.P.A. 1968).

For all of the foregoing reasons, the rejection should be withdrawn.

B. Claims 1, 2, 39, 41-43, 47, 49-51, 56, and 57

Claims 1, 2, 39, 41-43, 47, 49-51, 56, and 57 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Holmes in view of Ruta *et al.*, U.S. Patent No. 6,012,647 ("Ruta"). (Paper No. 20110628 at 8-10). For the reasons set forth below, the rejection is respectfully traversed.

Holmes has been summarized previously. (See, Sect. 1A, *supra*). Ruta discloses, inter alia, an apparatus for vaporizing a first liquid by colliding at least one gas with the liquid outside of the apparatus. The Ruta process includes an atomization step in which fine droplets are briefly formed prior to vaporization.

The present invention provides a novel apparatus that causes a heated stream of gas to implosively and convergingly collide with at least one liquid stream in order to atomize and vaporize the liquid. Initially, the collision atomizes the liquid to form a mist of fine liquid droplets. The droplets, being in intimate contact with a relatively large volume of the gas, quickly vaporize with minimal slippage. Vaporization occurs quickly even at temperatures well below the boiling point of the liquid, because the partial pressure of the resultant vapor in the gas is well below the saturation pressure. Additionally, using implosive collision in this manner provides liquid droplets that have a smaller average droplet size with a narrower particle size distribution than atomized droplets obtained by using more conventional atomization devices. This capability is particularly beneficial in order to be able to quickly vaporize the droplets and then cause the resultant vapor to condense as a thin, substantially

defect-free coating of uniform thickness upon any of a wide variety of substrates; although, in some cases discontinuous coatings can be intentionally made.

(Col. 2, Ins. 12-31).

Ruta discloses that prior to vaporization, droplets of 10-30 micrometers in diameter are transiently formed prior to vaporization.

FIGS. 1a, 1b, 1c and 2 schematically show one representation of a preferred apparatus 10 of the present invention suitable for atomizing and vaporizing a liquid composition. Generally, apparatus 10 is structured to cause stream 14 of gas 16 to convergingly and implosively collide with stream 18 of liquid composition 12 at collision site 20 in front of apparatus 10. The implosive energy of the collision atomizes stream 18 of liquid composition 12 to form a plurality of atomized liquid droplets 22. Preferably, liquid droplets 22 have an average droplet size of less than 200 micrometers, preferably 10 to 100 micrometers, more preferably 10 to 30 micrometers. For purposes of clarity, a collision involving only one liquid stream 18 and one gas stream 14 is shown. Alternatively, a plurality of liquid streams could be used if desired.

Following atomization, liquid droplets 22 quickly vaporize and become dispersed in gas 16 as a non-light-scattering vapor phase schematically depicted as vapor 24. Vapor 24 preferably is a true vapor, but also might be a dispersed phase in which dispersed droplets are too small, e.g., being of an average size of less than about 30 nm, to scatter visible and/or laser light having a wavelength of 630 nm to 670 nm.

(Col. 5, Ins. 5-26).

In making the rejection with respect to independent claims 1 and 39, the Examiner asserted that "Holmes shows a method of generating a mist

comprising the steps of: introducing a flow of transport fluid (Fig. 1, fluid 3) into a mixing chamber (24/32) through an annular transport nozzle (28); introducing a working fluid (20) into the mixing chamber through an annular working nozzle (22); generating a high velocity flow of the transport fluid by way of a convergent-divergent portion within the transport nozzle; orienting the transport nozzle and the working nozzle such that the high velocity transport fluid flow imparts a shearing force on the working fluid flow (col. 2, lines 5-13); and atomizing the working fluid and creating a dispersed droplet flow regime of droplets under the shearing action of the working fluid on the transport fluid in which a substantial portion of the droplets have a size.” (Paper No. 20110628 at 8). The Examiner acknowledged, however, that “Holmes does not teach in which a substantial portion of the droplets have a size less than 20 micrometers.” (Id.). To fill this acknowledged gap, the Examiner relied on Ruta as teaching “atomizing a fluid so that a substantial portion of the droplets have a size less than 20 micrometers (col. 5, lines 12-15).” (Id.). The Examiner concluded that “it would have been obvious to one of ordinary skill in the art to modify the size of droplets produced by Holmes to be in the range taught by Ruta et al. for a more uniform size and number density of the droplets (col. 1, lines 50-51).” (Id. at 9).

It is well settled that the Examiner bears the burden to set forth a *prima facie* case of unpatentability. *In re Glaug*, 62 USPQ2d 1151, 1152 (Fed. Cir. 2002); *In re Oetiker*, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); and *In re Piasecki*, 223 USPQ 785, 788 (Fed. Cir. 1984). If the PTO fails to meet its burden, then the applicant is entitled to a patent. *Glaug*, 62 USPQ2d at 1152.

A *prima facie* case of obviousness must be based on facts, "cold hard facts." *In re Freed*, 165 USPQ 570, 571-72 (C.C.P.A. 1970). When the rejection is not supported by facts, it cannot stand. *Ex parte Saceman*, 27 USPQ2d 1472, 1474 (B.P.A.I. 1993).

Our comments in Sections 1A and 2A, *supra*, are incorporated herein by reference. The factual gaps noted in Sections 1A and 2A with respect to Holmes and independent claim 1 are equally applicable to independent claim 39. And, the rejection identifies no disclosure or suggestion from Ruta to fill these gaps. Thus, for at least the reasons noted in Sections 1A and 2A, *supra*, which stand unrebutted, the rejection of claims 1, 2, 39, 41-43, 47, 49-51, 56, and 57 should be withdrawn.

As noted above, Ruta discloses an apparatus that creates a converging frustroconical flow of gas of annular cross-section **external** to the atomization device and a cylindrical core of the liquid as a jet. The two fluids do not meet until some distance external to the apparatus, where the cone of gas surrounds the core of liquid and atomizes and then vaporizes it. (See, e.g., Col. 1, Ins. 27-35). The type of device and process disclosed in Ruta is significantly different than the Holmes apparatus and process as well as the apparatus and method recited in claims 1 and 39, respectively. In view of these significant structural and process differences, one skilled in the art would not look to Ruta to improve upon Holmes. Indeed, the rejection provides no evidence as to why one would look to Ruta in order to improve upon Holmes. At best, the rejection rests its motivation to combine Holmes with Ruta based on two lines from Ruta, which

are taken out of context ("for a more uniform size and number density of the droplets (col. 1, lines 50-51)"). (Paper No. 20110628 at p. 9). The cited lines, however, are nothing more than the conclusion of a criticism of conventional plain-jet, air blast atomization devices, which tend to function in a high frequency pulsed fashion and thus produce atomized droplets with a size distribution that cyclically varies in accordance with the pulses. (Col. 1, lns. 37-51). There is simply no evidence or reasoning in the rejection as to how a plain-jet, air blast atomization device is at all related to the Holmes device. Nor is there any evidence of record that Holmes suffers from the same identified deficiency in the prior art plain-jet, air blast atomization devices (atomized droplets with a size distribution that cyclically varies in accordance with the pulses). Nor is there any evidence or suggestion as to why one skilled in the art would look to devices such as those disclosed in Ruta to modify Holmes in the manner suggested.

A *prima facie* case of obviousness, however, requires that the rejection describe with specificity **why** one skilled in the art would have combined two references to arrive at the claimed invention. *In re Dembiczak*, 50 USPQ2d 1614, 1617 (CAFC 1999). ("Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of *the requirement for a showing of the teaching or motivation to combine prior art references.*") (emphasis added). As noted above, no such explanation is found in the rejection.

Thus, the rejection is not supported by the kind of specificity required to sustain a conclusion of obviousness. *Ex parte Humphreys*, 24 USPQ

2d 1255, 1262 (B.P.A.I. 1992) ("The Examiner's rejection is not specific as to how one of ordinary skill in the art would have found it (the claimed invention) obvious"). For this reason also, the rejection should be withdrawn.

We also note that omnibus rejections are procedurally defective. (See MPEP § 707.07(d); see also 35 USC § 132 (PTO must provide applicant with clear notice of the basis for each rejection). The rejection of claims 1 and 39, which are both independent claims and directed to an apparatus and a method, respectively, required a separate factual and legal analysis for each claim. What is memorialized in the Office Action appears to be, at best, focused on a process. It cannot be discerned from the rejection as written, which comments are directed to the rejection of which claim. Accordingly, for this reason also the rejection is untenable and should be withdrawn.

For all of the foregoing reasons, the rejection should be withdrawn.

C. Claim 6

Claim 6 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Holmes in view of Base *et al.*, U.S. Patent No. 6,003,789 ("Base"). (Paper No. 20110628 at 11). For the reasons set forth below, the rejection is respectfully traversed.

Holmes has been summarized previously. (See, Sect. 1A, *supra*). Base discloses a nozzle assembly for producing and atomizing a mixture of oil and steam, for injection into the chamber of a reactor, such as a fluidized bed coker. The assembly includes a mixing means external of the reactor, for

producing a bubbly flow mixture of oil and steam, and an atomizing nozzle, internal of the reactor, for converting the mixture into a jet of fine liquid droplets. (Col. 1, Ins. 5-13). The nozzle is disclosed to be able to accelerate the mixture of steam and oil to supersonic velocities. (See, e.g., Abstract and Col. 4, In. 51). The nozzle assembly produces droplets with a mean diameter ranging from 250-350 μm . (See, e.g., Col. 3, In. 52 and Col. 7, In. 44). The mixture of oil and steam were pre-mixed prior to entry into the atomization nozzle. (See, e.g., Col. 4, In. 26 – Col. 5, In. 13).

In making the rejection, the Examiner acknowledged that “Holmes does not teach that the mixing chamber includes a converging portion.” (Paper No. 20110628 at 11). To fill this acknowledged gap, the Examiner relied on Base as teaching “a mixing chamber (Fig. 2, 10) including a converging portion.” (Id.). The Examiner then concluded that it would have been obvious to have the mixing chamber of Holmes including a converging portion as taught by Base to accelerate the flow (abstract). (Id.).

It is well settled that the Examiner bears the burden to set forth a *prima facie* case of unpatentability. *In re Glaug*, 62 USPQ2d 1151, 1152 (Fed. Cir. 2002); *In re Oetiker*, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); and *In re Piasecki*, 223 USPQ 785, 788 (Fed. Cir. 1984). If the PTO fails to meet its burden, then the applicant is entitled to a patent. *Glaug*, 62 USPQ2d at 1152.

Our comments in Sections 1A and 2A, *supra*, are incorporated herein by reference. The factual gaps noted in Sections 1A and 2A with respect to Holmes and independent claim 1 are equally applicable to dependent claim 6.

And, the rejection identifies no disclosure or suggestion from Base to fill these gaps. Thus, for at least the reasons noted in Sections 1A and 2A, supra, which stand un rebutted, the rejection of claim 6 should be withdrawn.

In addition, as set forth above, Base discloses "producing a bubble flow stream of a mixture of heavy oil and steam and atomizing the mixture." (Col 2, lines 39-41). Base, like Holmes, discloses an apparatus in which the fluids are mixed first and then subject to atomization. In contrast, claim 6 discloses an apparatus in which two fluids mix while they are being atomized, whereby the act of the gas impinging on the liquid causes the atomization. As one skilled in the art would recognize, conceptually the mechanism of action defined by the structure recited in claim 6 is very different compared to the mechanism of action defined by the structure of the Holmes or Base apparatuses. Thus, even if combined in the manner suggested by the Examiner, the subject matter of claim 6 is not obtained. For this reason also the rejection should be withdrawn.

For all of the foregoing reasons, the rejection should be withdrawn.

D. Claim 46

Claim 46 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Holmes in view of Ruta and Base. (Paper No. 20110628 at 11). For the reasons set forth below, the rejection is respectfully traversed.

Holmes, Ruta, and Base have been summarized previously.

In making the rejection, the Examiner asserted that "Holmes as modified by Ruta teaches introducing the transport fluid into the mixing chamber."

(Id.). The Examiner acknowledged, however, that the combination of Holmes and Ruta “does not teach introducing the fluid as a supersonic flow.” (Id.). To fill this acknowledged gap, the Examiner relied on Base as teaching the introduction of “the fluid into the mixing chamber as a supersonic flow.” (Id.). The Examiner then concluded that “it would have been obvious to introduce the transport fluid of Holmes as modified by Ruta et al. as a supersonic flow as taught by Base to reduce the droplet size (abstract).” (Id.).

It is well settled that the Examiner bears the burden to set forth a *prima facie* case of unpatentability. *In re Glaug*, 62 USPQ2d 1151, 1152 (Fed. Cir. 2002); *In re Oetiker*, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); and *In re Piasecki*, 223 USPQ 785, 788 (Fed. Cir. 1984). If the PTO fails to meet its burden, then the applicant is entitled to a patent. *Glaug*, 62 USPQ2d at 1152.

Our comments in Sections 1A, 2A, 2B, and 2C, *supra*, are incorporated herein by reference. The factual gaps noted in Sections 1A, 2A, 2B, and 2C with respect to Holmes, Ruta, and Base and independent claim 1 are equally applicable to dependent claim 46. And, the rejection identifies no disclosure or suggestion from Base to fill these gaps. Thus, for at least the reasons noted in Sections 1A, 2A, 2B, and 2C, *supra*, which stand unrebutted, the rejection of claim 46 should be withdrawn.

We also note that the rejection (at p. 11) asserts that Base teaches “introducing the fluid into the mixing chamber as a supersonic flow.” What the rejection has failed to come to grips with is that this is **after** the gas and fluid (oil) have already mixed. At bottom, Base discloses a different apparatus, a different

fluid (a mixture instead of just a gas), and a different atomization mechanism compared to claim 46. Thus, Base does not remedy any of the deficiencies noted above in Holmes. For this reason also the rejection should be withdrawn.

For all of the foregoing reasons, the rejection should be withdrawn.

E. Claims 52 and 58

Claims 52 and 58 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Holmes in view of Ruta and Rummel, U.S. Patent No. 7,040,551 (Rummel). (Paper No. 20110628 at 11-12). For the reasons set forth below, the rejection is respectfully traversed.

Holmes and Ruta have been summarized previously. Rummel discloses a nozzle for foaming, spraying, or misting. The nozzle is principally used to foam cement, although other uses, such as fire extinguishing, are briefly mentioned. (P. 4, para. 50). Generally, Rummel discloses a nozzle that includes a housing with an annular component. The annular component includes ducts for feeding a second medium, *e.g.*, a gas, a first inlet for feeding a medium to be foamed (*e.g.*, cement), and an outlet. (P. 5, para. 75). The ducts are disclosed to be configured as round bores to permit optimum flow conditions. (*Id.*, para. 79 and Figure 1).

In making the rejection, the Examiner acknowledged that Holmes as modified by Ruta “does not teach generation of condensation shocks and/or momentum transfer to provide suction within the apparatus” nor “does it specify that the mist is used for fire suppression.” (Paper No. 20110628 at 11-12). To fill

these acknowledged gaps, the Examiner relied on Rummel as teaching “generation of condensation shocks and/or momentum transfer to provide suction with the apparatus (col. 4, lines 7-19)” and that the “mist is used for fire suppression (col. 7, line 8).” (Id. at 12). The Examiner then concluded that “it would have been obvious to utilize the mist of Holmes as modified by Ruta for fire extinguishing as taught by Rummel for safety. (Id.).

It is well settled that the Examiner bears the burden to set forth a *prima facie* case of unpatentability. *In re Glaug*, 62 USPQ2d 1151, 1152 (Fed. Cir. 2002); *In re Oetiker*, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); and *In re Piasecki*, 223 USPQ 785, 788 (Fed. Cir. 1984). If the PTO fails to meet its burden, then the applicant is entitled to a patent. *Glaug*, 62 USPQ2d at 1152.

Our comments in Sections 1A, 2A, and 2B, *supra*, are incorporated herein by reference. The factual gaps noted in Sections 1A, 2A, and 2B with respect to Holmes and Ruta and independent claims 1 and 39 are equally applicable to dependent claims 52 and 58. And, the rejection identifies no disclosure or suggestion from Rummel to fill these gaps. Thus, for at least the reasons noted in Sections 1A, 2A, and 2B, *supra*, which stand unrebutted, the rejection of claims 52 and 58 should be withdrawn.

We also note that the rejection is devoid of any evidence or reasoning that would have provided one skilled in the art with the motivation to make the proposed modifications to Holmes based on the disclosures of Ruta and Rummel. As noted previously with respect to Holmes and Ruta, each discloses methods and apparatus that are fundamentally different and directed to

solving different problems. Rummel only exacerbates this problem with another apparatus and method that is distinct from both Holmes and Ruta and which is principally focused on foaming cement. At bottom, there is simply no evidence or even suggestion why one skilled in the art would have been motivated to modify Holmes with Ruta and Rummel in the manner suggested in the Office Action.

A *prima facie* case of obviousness requires that the rejection describe with specificity **why** one skilled in the art would have combined two references to arrive at the claimed invention. *In re Dembiczak*, 50 USPQ2d 1614, 1617 (CAFC 1999) (“Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of *the requirement for a showing of the teaching or motivation to combine prior art references.*”) (emphasis added). As noted above, no such explanation is found in the rejection.

Thus, the rejection is not supported by the kind of specificity required to sustain a conclusion of obviousness. *Ex parte Humphreys*, 24 USPQ 2d 1255, 1262 (B.P.A.I. 1992). (“The Examiner’s rejection is not specific as to how one of ordinary skill in the art would have found it (the claimed invention) obvious”). For this reason also, the rejection should be withdrawn.

For all of the foregoing reasons, the rejection should be withdrawn.

F. Claims 59 and 60

Claims 59 and 60 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Holmes in view of Ruta and Letvin, U.S. Patent No. 3,385,030 (Letvin). (Paper No. 20110628 at 12-13). For the reasons set forth below, the rejection is respectfully traversed.

Holmes and Ruta have been summarized previously. Letvin discloses a gas scrubber and process for removing contaminating particulate matter, particularly very fine particles, from an air or gas stream. (See, e.g., Abstract; Col. 1, Ins. 31-34; and 8-16).

It is the principal object of the present invention to provide a gas scrubber of a highly efficient and effective nature capable of removing substantially all size ranges of contaminating particulate material from as large a volume of contaminated air or gas as possible by utilizing a minimum amount of air or vapor which is introduced under high pressure to effect maximum atomizing of said washing liquid to [sic] finest fog-like particle size, down to sub-micron size, to provide maximum acceleration of said liquid fog-like particles, which acceleration is transmitted to said maximum volumes of incoming contaminated air or gas incident to purifying the same and thereby also similarly accelerating movement of the same through said purifying apparatus.

(Col. 2, Ins. 25-38).

In making the rejection, the Examiner acknowledged that "Holmes as modified by Ruta does not teach using the mist for decontamination or gas scrubbing." (Paper No. 20110628 at 12). To fill this acknowledged gap, the Examiner relied on Letvin as teaching use of "a mist for decontamination (col. 4, lines 3-4) and gas scrubbing (col. 1, lines 31-34)." (Id. at 13). The Examiner then concluded that "it would have been obvious to utilize the mist of Holmes as

modified by Ruta for decontamination and gas scrubbing as taught by Letvin for the purposes of cleaning industrial type gases before discharging them into the atmosphere (col. 1, lines 35-36)." (Id.).

It is well settled that the Examiner bears the burden to set forth a *prima facie* case of unpatentability. *In re Glaug*, 62 USPQ2d 1151, 1152 (Fed. Cir. 2002); *In re Oetiker*, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); and *In re Piasecki*, 223 USPQ 785, 788 (Fed. Cir. 1984). If the PTO fails to meet its burden, then the applicant is entitled to a patent. *Glaug*, 62 USPQ2d at 1152.

Our comments in Sections 1A, 2A, and 2B, *supra* are incorporated herein by reference. The factual gaps noted in Sections 1A, 2A, and 2B with respect to Holmes and Ruta and independent claims 1 and 39 are equally applicable to dependent claims 59 and 60. And, the rejection identifies no disclosure or suggestion from Letvin to fill these gaps. Thus, for at least the reasons noted in Sections 1A, 2A, and 2B, *supra*, which stand unrebutted, the rejection of claims 59 and 60 should be withdrawn.

We also note that the rejection is devoid of any evidence or reasoning that would have provided one skilled in the art with the motivation to make the proposed modifications to Holmes based on the disclosures of Ruta and Letvin. As noted previously with respect to Holmes and Ruta, each discloses methods and apparatus that are fundamentally different and directed to solving different problems. Letvin only exacerbates this problem with another apparatus and method that is distinct from both Holmes and Ruta and which is principally focused on scrubbing fine particulate matter from, e.g., industrial

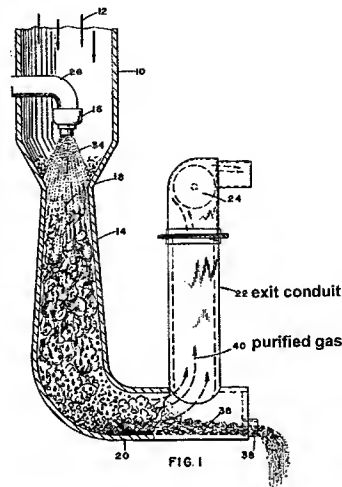
smoke stacks. At bottom, there is simply no evidence or even suggestion why one skilled in the art would have been motivated to modify Holmes with Ruta and Letvin in the manner suggested in the Office Action.

As noted previously, a *prima facie* case of obviousness requires that the rejection describe with specificity **why** one skilled in the art would have combined two references to arrive at the claimed invention. *In re Dembiczak*, 50 USPQ2d 1614, 1617 (CAFC 1999) (“Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of *the requirement for a showing of the teaching or motivation to combine prior art references.*”) (emphasis added). Again, no such explanation is found in the rejection.

Thus, the rejection is not supported by the kind of specificity required to sustain a conclusion of obviousness. *Ex parte Humphreys*, 24 USPQ 2d 1255, 1262 (B.P.A.I. 1992). (“The Examiner’s rejection is not specific as to how one of ordinary skill in the art would have found it (the claimed invention) obvious”). For this reason also, the rejection should be withdrawn.

With respect to claim 59, we note that the Office Action cites solely to “col. 4, lines 3-4” for the proposition that Letvin discloses “a mist for decontamination.” (Paper No. 20110628 at 13). The portion of Letvin cited in the Office Action, however, is directed to the gas scrubber depicted in Figure 1 – not a decontamination process recited in claim 59. Indeed, column 4, lines 3-4 of

Letvin describe the exit conduit (22) where the purified gas (40), i.e., scrubbed gas, is shunted after the scrubbing process.



Thus, the rejection has clearly misconstrued the recited section of Letvin and cannot stand. Indeed, one way in which an Examiner's burden is not met is when the Examiner misconstrues a document cited in a rejection. See, e.g., *Ex parte Jones*, 1994 WL 1687158, *1-2 (B.P.A.I. 1994) (reversing a rejection under §103 because the Examiner misconstrued the primary reference, Cramer) and *Ex parte Ottesen*, 2009 WL 3030307, *6 (B.P.A.I. 2009) (reversing a rejection under §103(a) because the Examiner misconstrued the secondary reference, Law). For this reason also, the rejection should be withdrawn at least with respect to claim 59.

For all of the foregoing reasons, the rejection should be withdrawn.

3. Provisional Double Patenting Rejection

A. Claims 1-6, 8-12, 14, 15, 19-22, 28, 35-44, 46, 47, 49-52, and 56-60

Claims 1-6, 8-12, 14, 15, 19-22, 28, 35-44, 46, 47, 49-52, and 56-60 stand provisionally rejected under nonstatutory double patenting over claims 52-89 of copending U.S. application serial no. 10/590,456. (Paper No. 20110628 at 2-4). In making the rejection, the Examiner asserts that "[t]he instant application is fully disclosed in the referenced copending application and would be covered by any patent granted on that copending application since the referenced copending application and the instant application are claiming common subject matter...." (*Id.*).

Because neither the present application nor the '456 application has been allowed yet, the issue of a terminal disclaimer is still premature and should be held in abeyance until one or both applications has allowable subject matter. See, *e.g.*, MPEP §804 ("If a 'provisional' statutory double patenting rejection is the only rejection remaining in one of the applications (but not both), the examiner should withdraw the rejection in that application and permit that application to issue as a patent, thereby converting the 'provisional' double patenting rejection in the other application into a double patenting rejection when the application issues as a patent."). Thus, if the present application is allowed before the '456 application is allowed, the double patenting rejection in the present application should be withdrawn.

Application No.: 10/590,527
Response Dated: January 13, 2012
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Accordingly, this rejection is respectfully deferred until there is allowable subject matter in the present application.

For the reasons set forth above, withdrawal of the rejections and allowance of the claims are respectfully requested. If the Examiner has any questions regarding this paper, please contact the undersigned.

I hereby certify that this correspondence is being transmitted in accordance with 37 CFR §§1.6(a)(4) and 1.8 via the U.S. Patent and Trademark Office (USPTO) electronic filing system (EFS-Web) to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on January 13, 2012.


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